

# Assignment

## 1. Defining terms:

- Random: Library.
- Chromosome: A string in population.
- POP\_SIZE: Number of Chromosomes in our list.
- MUT\_RATE: Rate at which our string will be changed.
- TARGET: Our goal.
- GENES: Options from which our population would be created.

```
import random

POP_SIZE = 500
MUT_RATE = 0.1
TARGET = 'computational cognitive science'
GENES = 'abcdefghijklmnopqrstuvwxyz'
```

# Assignment

2. **Initialization:** This function returns initial population.
  - Generating a population of size equal to TARGETS length. Each of the string in population would be called “Chromosome” and each Chromosome consists of only the letters defined in GENES.
3. **Selection:** This function returns top 50% population sorted according to fitness.
  - To select the best chromosomes we need to sort them in ascending order as per our fitness definition. We are returning only the top 50% of the population to avoid bad chromosomes from entering future population.



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4. **Fitness Calculation:** This function returns chromosomes along with their fitness level.

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5. **Crossover:** This function will return a list of offspring with a length equal to the length of initial population.
6. **Mutation:** This function would return a mutated list of population.
7. **Replacement:** This function will return the best chromosomes from our initial population and new gen.
8. **Main function:**
  - 1) Initialize population
  - 2) Calculating the fitness for the current population
  - 3) Now we loop until TARGET is found
    - 1) select best people from current population.
    - 2) mate parents to make new generation.
    - 3) mutating the children to diversify the new generation.
    - 4) replacement of bad population with new generation.